#17 Appeal Brief Board 3/29/02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Smith, et al.	Docket No:	TI-25250
Serial No:	09/199,829	Conf. No:	4119
Examiner:	Julio Maldonado	Art Unit:	2823
Filed:	11/25/98		

For: HYDROGEN PLASMA PHOTORESIST STRIP AND POLYMERIC RESIDUE CLEANUP PROCESS FOR OXYGEN-SENSITIVE MATERIALS

APPEAL BRIEF UNDER 37 C.F.R. 1.192

March 13, 2002

MAILING CERTIFICATE UNDER 37 C.F.R. §1.8(A)
I hereby certify that this Appeal Brief filed, in triplicate, under 37 CFR 1.192 is being deposited with the U.S. Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner of Patents, Washington, DC 20231 on 3-13-02.

Ann Trent
Ann Trent

Assistant Commissioner of Patents
Washington, D. C. 20231

Dear Sir:

This is Applicants' Appeal Brief filed pursuant to 37 C.F.R. 1.192 and the Notice of Appeal filed December 20, 2001.

Real Party in Interest under 37 C.F.R. 1.192(c)(1)

Texas Instruments Incorporated is the real party in interest.

Related Appeals and Interferences under 37 C.F.R. 1.192 (c)(2)

There are no related appeals or interferences known to appellant, the appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the board's decision in the pending appeal.

Status of Claims on Appeal under 37 C.F.R. 1.192 (c)(3)

Claims 1, 4-6, and claims 25 – 31 are pending in this case, upon entry of amendment filed 09 / 28 / 2000. Claims 1, 4-6, and 25 –31 are appealed.

Status of Amendments Filed After Final rejection under 37 C.F.R. 1.192 (c)(4)

An amendment after final rejection was filed on 11 / 16 / 2001. No response was received from the PTO regarding this amendment.

Summary of the Invention under 37 C.F.R. 1.192(c)(5)

The invention is a semiconductor processing method for passivating exposed metal structures following a metal etch process, removing the polymeric residue form various sidewall structures, and removing photoresist.

Photoresist is often used to form openings in dielectric layers before forming metal structures on integrated circuits. Previously formed metal layers will often be exposed beneath these openings (page 8, lines 12 – 28, and page 9, lines 1-11). To remove the photoresist without damaging the exposed metal layer a remote downstream plasma with substantially no oxidizing chemical component is used (page 9, lines 17-19). In an embodiment of the instant invention this consists of exposing the structure to a hydrogen-containing (with or without the addition of argon or nitrogen) or deuterium-containing process. (page 9, lines 19-22). If the exposed conductor contains

copper or other oxygen-sensitive material, it is important that no appreciable amount of oxygen be used during the process (page 10, lines 1-2).

Statement of Issues Presented for Review under 37 C.F.R. 1.192 (C)(6)

1. Are claims 1, 4-6, and 25-31 properly rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (U.S. Patent No. 5,578,526) in view of Irving et al. (U.S. Patent 3,837,856).

Statement of the Grouping of Claims under 37 C.F.R. 1.192(C)(7)

Claims 1, 4-6, and 25-31 stand or fall together.

Arguments

1. Are claims 1, 4-6, and 25-31 properly rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (U.S. Patent No. 5,578,526) in view of Irving et al. (U.S. Patent 3,837,856).

Patent owner respectfully submits that claims 1, 4-6, and 25-31 are not properly rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (U.S. Patent No. 5,578,526) in view of Irving et al. (U.S. Patent 3,837,856). Independent claim 1 recites a method of removing a photoresist layer after using the photoresist layer to pattern an underlying layer using a downstream plasma process comprising hydrogen or deuterium and substantially no oxidizing component. The patterning of the underlying layer exposes an oxygen sensitive layer.

In an office action dated 09/25/2001, the examiner argues that Irving et al. teaches that any one of a number of gases such as hydrogen may be used. The examiner also cites *Merck & Co v. Biocraft Laboratories, 874 F.2d 808* for the proposition that "[a] reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill (in) the art, including nonpreferred embodiments.

The applicant would like to respectfully point out to the examiner that the mere mention of the word hydrogen in a sentence does not teach or reasonably suggest the use of hydrogen as an embodiment preferred or not. The Irving et al. patent is enabling with regard to the use of oxygen and nothing else. It is a basic tenet of patent law that , "[I]n order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method. *Beckman Instruments, Inc. V. LKB Produkter, 892 F.2D 1547, 13 U.S.P.Q.2D (BNA) 1301* citing *In re Payne, 606 F.2d 303, 314, 203 U.S.P.Q. (BNA) 245, 255 (CCPA 1979).* The Irving et al patent teaches the use of oxygen. It provides a description of the apparatus, method, and conditions for the use of oxygen. Beyond providing a wish list of addition gases the Irving et al patent does not teach how any of these gases can be used. It is obvious that hydrogen cannot merely be substituted for oxygen using the same apparatus and conditions outlined in the patent. Therefore the use of hydrogen without oxygen is clearly not taught, or enabled, or reasonably suggested by the Irving et al. patent. The Irving et al. patent being clearly not enabling with regard to the use hydrogen cannot, under Beckman Instruments, be used to render the method of the instant invention obvious. As such, while the Irving et al. patent is a valid reference for oxygen it is not a valid reference for the use of hydrogen under existing patent law. Since Akram et al. does not teach the use of hydrogen then claim 1 is allowable over Akram et al. in view of Irving et al.

Similarly independent claims 25 and 29 both recite methods for removing photoresist and the residue left on the semiconductor after photoresist removal using a downstream plasma process comprising hydrogen or deuterium and substantially no oxidizing component. In this two step process the photoresist is first removed by

exposure to a first downstream plasma process comprising hydrogen or deuterium and substantially no oxidizing component. Following the removal of the photoresist, any residue left on the wafer is removed using a second downstream plasma process comprising hydrogen or deuterium and substantially no oxidizing component. The same arguments advanced above for claim 1 also apply to claims 25 and 29.

In view of the above arguments independent claims 1, 25, and 29 and their dependent claims 4-6, 26-28, and 30-31 are believed to be allowable over Akram et al. (U.S. Patent No. 5,578,526) in view of Irving et al.

Respectfully submitted,

Peter McLarty
Reg. No. 44,923
Attorney for Appellants

Texas Instruments Incorporated
P. O. Box 655474, MS 3999
Dallas, Texas 75265
(972) 917-4258

APPENDIX

Claims on Appeal

1. A method of fabricating an electronic device formed on a semiconductor wafer containing oxygen sensitive material, said method comprising the steps of:

forming a layer of a first material over said oxygen sensitive material;

forming a photoresist layer over said layer of said first material;

patterning said layer of said first material; and

removing said photoresist layer after patterning said layer of said first material using a downstream plasma process comprising hydrogen or deuterium and substantially no oxidizing component.

4. The method of claim 1, wherein said downstream plasma process comprises a gas mixture of which 60% to 100% consists of hydrogen or deuterium.

5. The method of claim 4, wherein said removing said photoresist layer is performed in a temperature range of 245°C to 350°C.

6. The method of claim 1, wherein said downstream plasma process further comprises a gas consisting of: argon, nitrogen, and any other inert gas.

25. A method of fabricating an electronic device formed on a semiconductor wafer, said method comprising the steps of:

forming a layer of a first material over said wafer, said first material is oxygen sensitive;

forming a photoresist layer over said layer of said first material;

patterning said layer of said first material;

removing said photoresist layer after patterning said layer of said first material using a downstream plasma process comprising hydrogen or deuterium and substantially no oxidizing component; and

removing a residue on said semiconductor wafer after removing said photoresist layer using a downstream plasma process comprising hydrogen or deuterium and substantially no oxidizing component.

26. The method of claim 25, wherein said downstream plasma process comprises a gas mixture of which 60% to 100% consists of hydrogen or deuterium.

27. The method of claim 26, wherein said removing said photoresist layer is performed in a temperature range of 245°C to 350°C.

28. The method of claim 25, wherein said downstream plasma process further comprises a gas consisting of nitrogen, argon, and any other inert gas.

29. A method of fabricating an electronic device formed on a semiconductor wafer, said method comprising the steps of:

forming a layer of a first material over said wafer, said first material is oxygen sensitive;

forming a photoresist layer over said layer of said first material;

patterning said layer of said first material;

removing said photoresist layer after patterning said layer of said first material; and

removing a residue, formed on the semiconductor wafer after removing said photoresist layer, using a downstream plasma process comprising hydrogen or deuterium and substantially no oxidizing component.

30. The method of claim 29, where said downstream plasma process comprises a gas mixture of which 60% to 100% consists of hydrogen or deuterium.

31. The method of claim 29, wherein said downstream plasma process further comprises a gas consisting of nitrogen, argon, and any other inert gas.